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METHOD FOR PROGRAMMING AN ELECTRICAL APPARATUS, SMART CARD, AND APPARATUS
[Verfahren zur Programmierung eines elektrischen Gerätes, Chipkarte und Gerät]

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Description

State of the art

The invention starts out from a method for programming electrical equipment, as well as a smart card and a device, in accordance with the generic type of the independent Claims.

Electrical equipment, such as, e.g., car radios or mobile telephone receivers, which have apertures that are required for the evaluation of a smart card are already familiar to the art. In car radios, the smart cards previously only served to store a code number for anti-theft protection. It is also familiar knowledge that data stored on the smart cards are read out by a car radio and can be displayed there, such as, e.g., the Aturn on message≅ (TOM). The data stored on the smart card have no influence on the predefined functional flow of the internal software of the equipment. They are read in, evaluated, potentially shown, but do not change the programmed equipment software. If equipment software was to be changed, an intervention in the car radio had been necessary so far because either processors or memory building blocks had to be exchanged or electrical contacts had to be established to programming units.

From DE 3435697, electrical equipment is familiar to the art, the functional characteristics of which are deposited in an electronic functional memory and which can be selected with the assistance of a special encoding card.

Advantages of the invention

In comparison, the inventive method with the characterizing features of the independent Claim has the advantage that a reprogramming of the equipment software of the equipment is possible because a loading routine is contained in the apparatus. The data of the new program are loaded from a smart card after the Aprogramming≅ function has been triggered. With the assistance of the loading routine, a subsequent expansion of equipment functions can also be realized. Also an adaptation to, e.g., modified peripheral conditions, as well as subsequent trouble shooting or an exchange of software-controlled characteristics of the apparatus can be realized with it in a simple manner.

Through the measures set forth in the Sub-Claims, an advantageous advancement and improvement of the method specified in the independent Claim is made possible.

It is of particular advantage that the exchange or the modification of the program, i.e., a partial or complete overwriting of the programmable memory, is made possible without any intervention in the equipment. Therefore, service calls are substantially shortened and costs are saved. The reprogramming is very easily managed.

It is advantageous that the beginning of the programming process can be triggered by the user from the smart card and in other ways too.

The inventive smart card with the characterizing features of the independent Claim has the advantage that the program is contained on the smart card either as a whole or also in parts. Thereby, a reprogramming by a one-time reading of a single smart card or several smart cards is

facilitated. An additional advantageous configuration represents a smart card which is configured in the form of an insertable card on which contacts for the card reading unit, as well as a contact for the establishment of a data connection with a larger memory unit, are present. It is thereby also possible to program programs, the size of which would exceed the memories of one single smart card. For this purpose, a PC is connected to the insertable card.

It is also advantageous to use an insertable card, which may contain memory building blocks, ASICs, and microprocessors, and can also execute programming.

The inventive electrical equipment with the characterizing features of the independent Claim has the advantage that it contains a means in which a loading routine was deposited, which controls the programming process when the apparatus is reprogrammed.

Advantageously, the loading routine is deposited in a non-volatile memory, so that it cannot be overwritten.

This advantage is also present if the loading routine is a function of the microprocessor.

For some cases it is better to file the loading routine in a part of the programmable memory.

Drawings

A configuration example of the invention is shown in the following drawings and in the subsequent description. Figure 1 depicts the schematic structural setup of the car radio, Figure 2 depicts an inventive insertable card.

Description of the configuration example

Figure 1 schematically and exemplarily represents the car radio (5) in which a microprocessor (6), as well as a programmable memory (7), is built in. Moreover, a memory (8) which can only be inscribed once is contained by the equipment. In this memory, e.g., an EPROM, a program code is deposited for software control, which must be worked off for reprogramming. The non-volatile memory may also be contained in the equipment=s internal processor system, in the ROM. Furthermore, the equipment has a recording and reading unit (9) in which smart cards, e.g., in accordance with ISO 7816, can be read. A memory (2) in which the program code for the reprogramming of the car radio is deposited is included on the smart card (1). Via the contact surface (10), the smart card is contacted with the card reading unit (9) and the program (2) can be read out. For this purpose, the loading routine is called up in the memory (8) by the microprocessor (6), which controls the entire new programming or reprogramming of the memory (7). The exchange of the program (2) in the programmable memory (7) may be an Aupdating≅ process which only requires a partial reprogramming of the program that was originally deposited in the memory, but may also entail complete reprogramming. The memory (7) is comprised of standard memory building blocks, e.g., a flash memory, which may also optionally be directly in the microprocessor.

In an alternate configuration, the loading routine is not filed in a separate memory, but, instead, it is a part of the programmable memory.

With a partial program adaptation, the loading routine remains intact, or is overwritten.

It is also possible to integrate the loading routine in the microprocessor where it then represents a special function of the process.

A realization of the smart card consists of an insertable card, which contains the data to be exchanged, the new program, or the program elements in their own appropriately sized data memories, e.g., flash memories. Such an insertable card can reprogram an entire program content.

In many cases, the storage options of a single smart card may be insufficient for completely reprogramming the equipment software. Today=s smart cards, e.g., make available a memory space of 8 kbytes.

Therefore, it is also possible to transfer an extended program or extended program elements to the equipment by reading several smart cards.

If even greater data quantities are to be exchanged, the presence of a smart card can be mechanically and electrically simulated. This is achieved by means of an insertable card (11) which exhibits the appropriate electrical contacts (10) and which otherwise also resembles a smart card mechanically. Such an insertable card may optionally also contain additional electrical components, such as, e.g, a microprocessor or ASICs. The smart card establishes contact to the car radio via a contact surface (10). Moreover, the smart card exhibits an electrical contact (12) to which a more sizeable mass memory (14) can be connected via a connecting cable (13). In general, such a mass memory will be located in a PC, so that the data to be exchanged can be read into the car radio via the PC. This setup with a smart card has the advantage that the car

radio itself will not require a programming interface besides the existing card reading unit during a reprogramming process.

When the electrical contact of the inventive smart card is established in the card reading unit, the equipment recognizes that the loading routine must be called up. The initialization of the loading routine may be triggered via the smart card itself or by the user.

In this context, it is conceivable that a special key is operated or a code card is used, which transfers the legitimization of the user for reprogramming.

Patent Claims

1. Method for programming electrical equipment with a recording and reading unit (9) for smart cards, with programmable memories (7) in which software that can be worked off by the microprocessor (6) can be worked off, is filed, characterized in that the following process steps are carried out:

a) insertion of a smart card (1) with a memory building block for data (2) into the recording and reading unit (9),

b) triggering of a Aprogramming≅ function of the microprocessor (6), whereas a loading routine (8) is activated which then loads data of the memory building block of the smart card (1) into the programmable memory of the apparatus (7).

2. Method for programming electrical equipment in accordance with Claim 1, characterized in that the loading routine (8) facilitates a partial or complete overwriting of the programmable memory (7).

3. Method for programming electrical equipment in accordance with Claim 1 or 2, characterized in that the triggering of the Aprogramming≅ function occurs via the smart card (1).

4. Method for programming electrical equipment in accordance with Claims 1 and 2, characterized in that the triggering of the Aprogramming≅ function occurs through the user=s input.

5. Method for programming electrical equipment in accordance with Claims 1 to 2, characterized in that the triggering of the Aprogramming≅ function is carried out by using a code card prior to the insertion of the smart card (1).

6. Smart card (1) for programming electrical equipment exhibiting a recording and reading unit (9) for smart cards, a microprocessor (6), and a programmable memory (7), characterized in that the data to be transferred are contained in a memory building block (2) of the smart card.

7. Smart card (1) for programming electrical equipment exhibiting a recording and reading unit (9) for smart cards, a microprocessor (6), and a programmable memory (7), characterized in that the smart card is simulated by an insertable card (11) which can produce a connection to an external mass memory (14) containing the data to be transferred via additional contacts (12).

8. Smart card (1) for programming electrical equipment exhibiting a recording and reading unit (9) for smart cards, a microprocessor (6), and a programmable memory (7), characterized in that the smart card is

simulated by an insertable card (11) which optionally has memory building blocks, ASICs, microprocessors.

9. Electrical equipment with a recording and reading unit (9) for smart cards, a microprocessor (6), and programmable memories (7) in which software is filed that can be worked off by the microprocessor (6), characterized in that the equipment has a memory space (8) in which the loading routine is deposited.

10. Electrical equipment in accordance with Claim 9, characterized in that the loading routine is deposited in a non-volatile memory.

11. Electrical equipment in accordance with Claim 9, characterized in that the loading routine is integrated in the microprocessor.

12. Electrical equipment in accordance with Claim 9, characterized in that the loading routine is deposited in a separate partial area of the programmable memory (7).

Accompanied by 1 page(s) of drawings.

Fig. 1

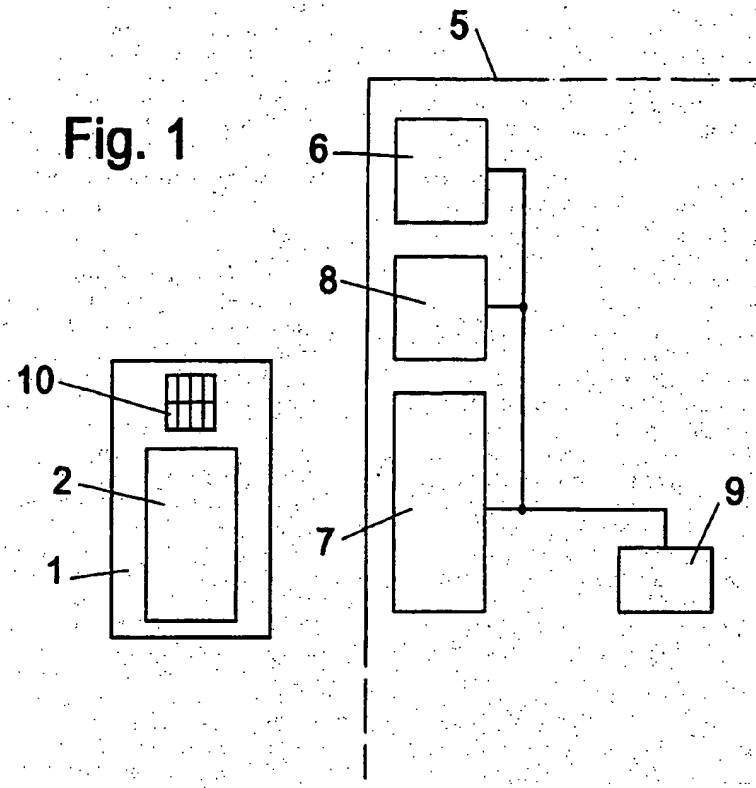

Fig. 2